

### **REMARKS**

Upon entry of the present Amendment, claims 25-41, 44-48 and 65-78 will be pending. Claims 1-24 and 51-64 are cancelled as non-elected claims. Claims 42, 43, 49 and 50 are cancelled to advance prosecution of the present application. Applicants reserve the rights to pursue the canceled subject matter in a subsequent application. The above-described amendments do not introduce any new matter into the present application.

#### **Restriction requirement**

Restriction to one of the following inventions is required:

I. Claims 1-24 and 51-64, drawn to Method and Apparatus for Acoustic Force Field Flow Fractionation, classified in class 435, subclass 289.1.

II. Claims 25-50 and 65-78, drawn to Method and Apparatus for Electrophoretic and Acoustic Force Field Flow Fractionation, classified in class 204, subclass 600.

Applicants hereby confirm the provisional election of Group II, claims 25-50 and 65-78, and have canceled non-elected claims 1-24 and 51-64 accordingly.

#### **Rejection under 35 U.S.C. § 112**

Claims 42, 43, 49 and 50 are rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner stated that Applicants use "consists essentially of" or "consists of" in the claim preamble which are regarded as closed language to describe the apparatus yet Applicants also use "at least" in the claim which is regarded as open language to describe inlet and outlet ports, electrode elements, electrical signals, electrophoretic force, piezoelectric transducer and acoustic force which all materially affect the basic novel characteristics of the apparatus.

Applicants respectfully submit that the above rejection has been overcome by the cancellation of claims 42, 43, 49 and 50.

It is respectfully submitted that the rejection of claims 42, 43, 49 and 50 under 35 U.S.C. § 112 is overcome by the above amendments and must be withdrawn.

**Rejection under 35 U.S.C. § 103**

Claims 25-50, 65, 68-69, 72 and 75-76

Claims 25-50, 65, 68-69, 72 and 75-76 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Becker, et al., U.S. Patent No. 5,888,370 (Becker) in view of Cannon, et al., U.S. Patent No. 5,245,290 (Cannon). The Examiner recognized that Becker does not specifically teach one or more piezoelectric transducers.

Cannon is alleged to teach a method of generating acoustic waves by applying an inhomogeneous electric field using an array of electrodes measured by piezoelectric transducers to determine particle charge and size distribution especially electrophoretic mobility of particles in suspension.

The Examiner alleged that it would have been obvious to one of ordinary skill in the art to generate and measure an acoustic wave in the device and method of Becker in order to separate particles in suspension as well as measure particle characteristics, such as electrophoretic mobility, size and charge.

This rejection is respectfully traversed. Becker and Cannon, whether alone or in combination, do not render the presently claimed invention obvious because there is no motivation, whether explicitly or implicitly, to combine the teachings of Becker and Cannon to arrive at the presently claimed apparatuses and methods.

As the Examiner recognized, Becker teaches field-flow-fractionation devices and methods using only dielectrophoretic force. Becker does not teach or suggest the use of acoustic force in field-flow-fractionation at all, let alone using a combination of dielectrophoretic force and acoustic force together. Cannon does not cure Becker's defect.

Contrary to the Examiner's assertion, Cannon is not related to field-flow-fractionation at all, let alone teaching or suggesting the use of acoustic force to discriminate a matter in field-

flow-fractionation. Cannon teaches an apparatus for determining the particle charge and size distribution of particles in suspensions of arbitrary concentration. The apparatus includes a cell for application of an unsteady electric field or an unsteady mechanical force across the suspension of at least two different frequencies for accelerating the particles. The resulting acoustic wave generated by application of the electric field applied to the electrodes, or the electrical response and the acoustic pressure at the electrodes generated by application of the mechanical force is measured (See Cannon at column 3, lines 35-65 and in Figure 3). Clearly, in Cannon, acoustic wave or acoustic pressure generated by other forces is measured for determining the particle charge and size distribution of particles in suspensions. No acoustic force is used actively to discriminate any particle in the suspensions.

The nature of the motivation required in order to justify combining documents in support of an art rejection has been outlined by the Federal Circuit in *In re Rouffet*, 47 USPQ2d 1453 (Fed. Cir. 1998). As there clearly set forth, only three recognized motivations are acceptable. The first is a suggestion in the documents themselves. There is no such suggestion here either in Becker or Cannon to combine the teachings of the two references. The second possible rationale lies in the nature of the problem to be solved. What problem would this be? Although Becker relates to field-flow-fractionation, Cannon is not. Thus Becker and Cannon are in two distinct fields and there is no common problem to be solved here. The third and final criterion is clearly not present - the notorious nature of at least one document cited such that everyone in the field would be expected to be aware of it.

In fact, Cannon teaches away from such combination to arrive at the presently claimed invention. The test for "teaching away" is that a "reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." *In re Gurley*, 27 F.3d 551, 553, 31 USPQ.2D 1130, 1131 (Fed. Cir. 1994). In addition, if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)

(Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The Court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.).

At column 8, lines 11-16, a portion relied by the Examiner for alleged teaching of piezoelectric transducers, Cannon teaches:

Receiving transducers 37 and 38 which detect the generated acoustic signals, are formed with a piezoelectric crystal material bonded to the ends of delay rods 24 and 26 to detect the amplitude and phase of the sound waves launched down delay rods 24 and 26 (emphasis added).

Thus, contrary to the Examiner's assertion, combining Becker with Cannon to arrive at the presently claimed invention would require the piezoelectric transducers be adapted along a portion of a chamber wherein the discrimination of a matter takes place (*See e.g.*, part c) of claim 25 of the present application). In other words, this would require that piezoelectric transducers 37 and 38 in Cannon be adapted along a portion of the cavity 22 (*See* Figure 3 of Cannon), not attached to delay rods 24 and 26 as required in Cannon. This modification, as proposed by the Examiner, would render Cannon inoperable, and the skilled artisans would not combine the teachings of Cannon with Becker to arrive at the presently claimed apparatuses and methods.

In addition, even assuming, *arguendo*, there were motivation to combine the references, combination of the teachings of these references would not result in all the elements of presently

pending claims. Each of the presently pending claims has the limitation “at least one piezoelectric transducer adapted along a portion of said chamber, wherein said piezoelectric transducer can be energized via at least one electrical signal provided by an electrical signal generator to create an acoustic wave, thereby causing at least one acoustic force having components normal to the traveling direction of said carrier medium on a matter in said carrier medium (emphases added).” As discussed above, piezoelectric transducers 37 and 38 in Cannon are separated from the chamber (referred to as cavity 22 in Figure 3 of Cannon) and are not adapted along a portion of the chamber (or cavity 22). In addition, as discussed above, none of the piezoelectric transducers in Cannon is used to actively exert an acoustic force on the particles in the suspensions, let alone causing an acoustic force having components normal to the traveling direction of the carrier medium on a matter in the carrier medium.

#### Claims 66-67, 70, 71, 73, 74 and 77-78

Claims 66-67, 70, 71, 73, 74 and 77-78 are rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Becker in view of Cannon and further in view of Yasuda, et al., U.S. Patent No. 6,216,538 (Yasuda).

This rejection is respectfully traversed for the same reasons, as discussed above, in connection with the obviousness rejection over Becker in view of Cannon.

It is respectfully submitted that the rejections of claims 25-50 and 65-78 under 35 U.S.C. § 103 have been overcome by the above remarks and must be withdrawn.

#### CONCLUSION

Applicants submit that the rejections of claims 25-50 and 65-78 under 35 U.S.C. §§ 103 and 112 have been overcome by the above remarks and/or amendments. Early allowance of the pending claims 25-41, 44-48 and 65-78 are earnestly requested.

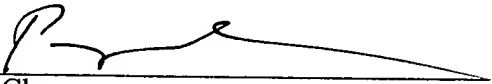
In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, Applicant petitions for

- any required relief including extensions of time and authorizes the Assistant Commissioner to
- charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 471842000200.

Respectfully submitted,

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